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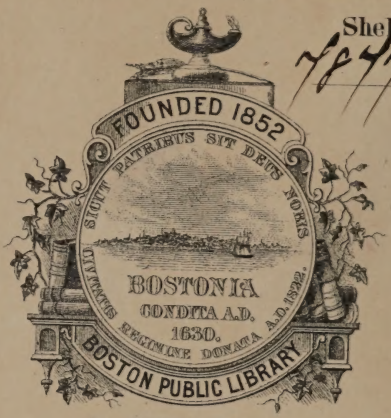

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REMARKS

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ON THE

RELATIONS OF ANOMIA.

BY EDWARD S. MORSE, PH.D.

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ON THE RELATIONS OF ANOMIA.

BY EDWARD S. MORSE, PH.D.

UNDER the name Anomia was included Terebratula by the early writers. Misled by external appearance, Linnæus, Lamarck and others believed Anomia and Terebratula to be closely related. While not the slightest ground existed for bringing them together, yet the mere fact of these two animals being enclosed within a living shell composed of two pieces, held to the rock by a process which passed out through that element of the shell which was undermost in both cases, furnished sufficient proof of their relationship to those who were ready to judge everything from external appearance.

The whales among fishes, the barnacles among mollusks, were only some of the blunders committed by this superficial way of comparison; and now after the external elements of the Brachiopods are admitted by all writers to be dorsal and ventral, while the valves of Anomia are right and left, and after the splendid memoir of Lacaze Duthier on the anatomy of Anomia[1] has shown that its nearest relations are with the Pectens etc., there are still some writers who vaguely imagine that some sort of relationship exists between the two.

It is refreshing to turn back twenty years and find Forbes stating that "a close examination shows that there is no relationship of affinity between them, but only a resemblance through formal analogy."

[1] Organization of Anomia. Ann. Sc. Nat. 1854, II series, 5-35.

This brief note is given to verify the correctness of a statement made by Forbes and Hanley in their standard work on the British Mollusca, wherein the shelly plug which escapes through the sinus of the flat valve to hold the animal to its base of attachment is compared to a byssus. They say "when the very young fry of this genus shall have been carefully observed, we believe they will be found spinning a byssus, which, passing through this sinus, fixes the shell in the first instance, before a portion of it becomes attached, eventually becomes detached with a part of the adductor muscle, and forms the opercular process." [1]

Fig. 1. Fig. 2.

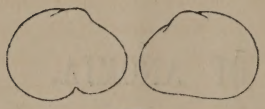

Fig. 3.

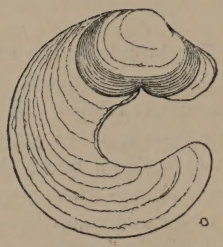

Fig. 4.

They erred only in conceiving that the byssus passed through a sinus occupying the same position as in the adult; this is not so, as will be shown presently.

Lacaze Duthier, after his exhaustive study of the organization of Anomia, refers to these

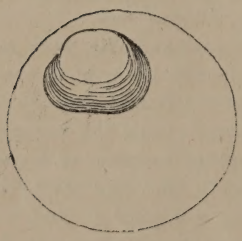

Fig. 5.

Fig. 6.

Fig. 1. Right or lower valve of Anomia, showing notch in ventral pallial margin, caused by byssus. Diameter one sixty-fourth inch.

Fig. 2. Left or upper valve of Fig. 1. Diameter one sixty-fourth inch.

Fig. 3. Foramen commencing to form. The black portion shows proportions of left valve.

Fig. 4. A more advanced stage of right valve with foramen almost completed.

Fig. 5. Left or upper valve of Fig. 4. Diameter one thirty-second of an inch.

Fig. 6. Showing later stage, with foramen completed, and nucleus still visible.

[1] Forbes and Hanley, British Mollusca, Vol. II, p. 323.

statements of Forbes and Hanley, and expresses his belief in their correctness, and in describing some peculiar features of asymmetry, aptly calls them the Pleuronectes among mollusks.

In examining some dried sea weed collected by a friend of mine during the last week in March, I noticed some very young Anomiæ clinging to it. Unfortunately nothing but the little dried shells were left for examination, but as these presented some exceedingly interesting points as bearing upon the homology of the plug to the byssus, I may be excused for presenting such incomplete observations. The specimens were easily detached from the sea weed with the point of a knife, without fracturing the shells; they were consequently very lightly attached. The smallest specimens examined are quite orbicular, the upper, or left valve, is very tumid near the nucleus, the lower or right valve is flat and somewhat smaller than the upper valve. The foramen, or sinus, is not closed, but opens on the anterior border of the shell. The chief point of interest, however, is seen in the nucleus, or that portion of the shell first formed when the animal was free and roving. This early condition of the shell is distinctly marked at the beak in both valves. It is yellowish in color, and marked with numerous, very regular concentric lines of growth, while the remaining portion of the shell is colorless or white with irregular lines of increment. The nucleus is oblong-oval. The umbones are nearly central though nearer the anterior margin, and the shell is more globose behind. Both valves of the nucleus appear equally convex, and no sign of a sinus or perforation is visible in either valve. On the free edge of the right valve, directly under the umbone, a distinct notch is seen, the lines of growth indicating it, and showing that the edge of the shell is not absorbed to form this notch. It will be noticed that this marginal notch appears in that valve which is below, and which afterwards presents the opening for the passage of the byssal plug.

The condition of the shell at this time clearly indicates that the animal is not only already attached, but has fallen to one side, and while in this position has added a few more lines of increment to its larval shell, as no sign of this notch is seen on the left or free valve. Soon, however, the peculiar and rapid secretion of a different shell growth takes place; the lines of increment are no longer regular, nor so conspicuous, and the shelly matter is white. The left valve adds concentric layers around its entire margin, not excepting the hinge margin. The lower valve appears to grow from its posterior and

lower half, the successive accretions being produced around the byssus. This growth for a while seems to take place exclusively from the posterior half of the shell limited in front by the byssus, and even after this growth has increased to twice the diameter of the embryo shell only a slight increase is noticed on its anterior margin, this latter addition being slightly reflected.

The left or upper valve grows more rapidly, so that its margin overlaps the right valve at all points.

As the animal increases in size, the foramen increases also, and its earlier boundaries are consequently absorbed.

It will be seen by reference to the figures that the growth of the perforated valve is first posterior and downward, from the posterior half of the shell; it then grows forward, avoiding the byssal plug, and by successive additions surrounds the byssal plug and ultimately reaches the umbones of the larval shell, and even reaching beyond and behind this region. From these facts it is obvious that at an early stage the animal is free, and for a time locomotive; that it has an elongate, oval, bivalve shell, with close and regular lines of accretion, and that during the latter stage of this growth it becomes attached by a byssus passing from between the valves as in Mytilus; that before the growth of the larval shell is completed, it drops over to one side, since one valve only shows the notch upon its margin, and that so soon as this growth ceases a new growth takes place, looser in texture, and white in color, as above described. In this excessive growth of the shell backward it is interesting to note that in the Mytilidæ the growth of the shell is almost entirely posterior, leaving the umbones at the extreme anterior portion of the shell.

It would appear that the larval shell is a true dimyarian and its affinities may possibly be quite remote from Ostrea or Pecten. A study of the early stages of the last named genera would easily remove all doubts upon these points.

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